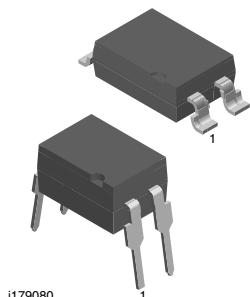
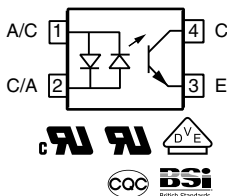


# Optocoupler, Phototransistor Output, AC Input



i179080



## FEATURES

- Good CTR linearity depending on forward current
- Isolation test voltage, 5300 V<sub>RMS</sub>
- High collector emitter voltage, V<sub>CEO</sub> = 70 V
- Low saturation voltage
- Fast switching times
- Low CTR degradation
- Temperature stable
- Low coupling capacitance
- End-stackable, 0.100" (2.54 mm) spacing
- High common-mode interference immunity
- Material categorization: For definitions of compliance please see [www.vishay.com/doc?99912](http://www.vishay.com/doc?99912)


**RoHS**  
COMPLIANT

## DESCRIPTION

The SFH620A (DIP) and SFH6206 (SMD) feature a high current transfer ratio, low coupling capacitance and high isolation voltage. These couplers have a GaAs infrared diode emitter, which is optically coupled to a silicon planar phototransistor detector, and is incorporated in a plastic DIP-4 or SMD package.

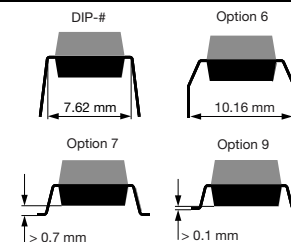
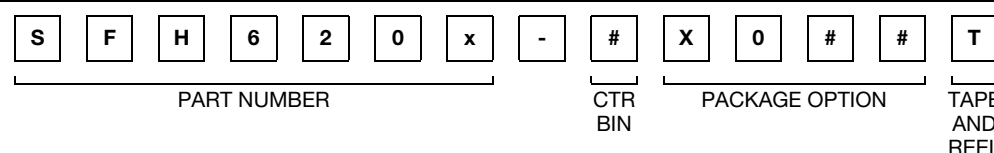
The coupling devices are designed for signal transmission between two electrically separated circuits. The couplers are end-stackable with 2.54 mm lead spacing. Creepage and clearance distances of > 8 mm are achieved with option 6. This version complies with IEC 60950 (DIN VDE 0805) for reinforced insulation to an operation voltage of 400 V<sub>RMS</sub> or DC.

## AGENCY APPROVALS

The safety application model number covering all products in this datasheet is SFH620A and SHF6206. This model number should be used when consulting safety agency documents.

- UL1577, file no. E52744 system code H, double protection
- CSA 93751
- BSI EN 60950, EN 60065
- DIN EN 60747-5-5 (VDE 0884-5), available with option 1
- CQC GB8898-2011, GB4943.1-2011

## ORDERING INFORMATION



| AGENCY<br>CERTIFIED/PACKAGE | CTR (%)       |                               |               |                           |                               |                               |
|-----------------------------|---------------|-------------------------------|---------------|---------------------------|-------------------------------|-------------------------------|
|                             | ± 10 mA       |                               |               |                           |                               |                               |
|                             | SFH620A       |                               |               | SFH6206                   |                               |                               |
| UL, cUL, BSI                | 40 to 125     | 63 to 200                     | 100 to 320    | 40 to 125                 | 63 to 200                     | 100 to 320                    |
| DIP-4                       | SFH620A-1     | SFH620A-2                     | SFH620A-3     | -                         | -                             | -                             |
| DIP-4, 400 mil, option 6    | SFH620A-1X006 | SFH620A-2X006                 | SFH620A-3X006 | -                         | -                             | -                             |
| SMD-4, option 7             | -             | SFH620A-2X007T <sup>(1)</sup> | -             | -                         | -                             | -                             |
| SMD-4, option 9             | -             | -                             | -             | SFH6206-1T <sup>(1)</sup> | SFH6206-2T <sup>(1)</sup>     | SFH6206-3T <sup>(1)</sup>     |
| VDE, UL, CUL, BSI           | 40 to 125     | 63 to 200                     | 100 to 320    | 40 to 125                 | 63 to 200                     | 100 to 320                    |
| DIP-4                       | SFH620A-1X001 | SFH620A-2X001                 | SFH620A-3X001 | -                         | -                             | -                             |
| DIP-4, 400 mil, option 6    | -             | SFH620A-2X016                 | SFH620A-3X016 | -                         | -                             | -                             |
| SMD-4, option 7             | -             | SFH620A-2X017T                | -             | -                         | -                             | -                             |
| SMD-4, option 9             | -             | -                             | -             | -                         | SFH6206-2X001T <sup>(1)</sup> | SFH6206-3X001T <sup>(1)</sup> |

## Notes

- Additional options may be possible, please contact sales office.
- <sup>(1)</sup> Also available in tubes; do not add T to end.



| <b>ABSOLUTE MAXIMUM RATINGS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |  |            |                |                    |
|--|--|------------|----------------|--------------------|
| PARAMETER  | TEST CONDITION   | SYMBOL     | VALUE          | UNIT               |
| <b>INPUT</b>   |  |            |                |                    |
| DC forward current   |  | $I_F$      | $\pm 60$       | mA                 |
| Surge forward current  | $t_p \leq 10\text{ }\mu\text{s}$                               | $I_{FSM}$  | $\pm 2.5$      | A                  |
| Power dissipation  |  | $P_{diss}$ | 100            | mW                 |
| <b>OUTPUT</b>  |  |            |                |                    |
| Collector emitter voltage  |  | $V_{CE}$   | 70             | V                  |
| Emitter collector voltage  |  | $V_{EC}$   | 7              | V                  |
| Collector current  | $t_p \leq 1\text{ }\mu\text{s}$                                | $I_C$      | 50             | mA                 |
|  |  | $I_C$      | 100            | mA                 |
| Power dissipation  |  | $P_{diss}$ | 150            | mW                 |
| <b>COUPLER</b>   |  |            |                |                    |
| Isolation test voltage between emitter and detector  | $t = 1\text{ s}$   | $V_{ISO}$  | 5300           | $V_{RMS}$          |
| Isolation voltage  |  | $V_{IORM}$ | 890            | $V_P$              |
| Total power dissipation  |  | $P_{tot}$  | 250            | mW                 |
| Creepage distance  |  |            | $\geq 7$       | mm                 |
| Clearance distance   |  |            | $\geq 7$       | mm                 |
| Insulation thickness between emitter and detector  |  |            | $\geq 4$       | mm                 |
| Comparative tracking index per DIN IEC112/<br>VDE 0303, part 1   |  | CTI        | 175            |                    |
| Isolation resistance   | $V_{IO} = 500\text{ V}, T_{amb} = 25\text{ }^{\circ}\text{C}$  | $R_{IO}$   | $\geq 10^{12}$ | $\Omega$           |
|  | $V_{IO} = 500\text{ V}, T_{amb} = 100\text{ }^{\circ}\text{C}$ | $R_{IO}$   | $\geq 10^{11}$ | $\Omega$           |
| Storage temperature range  |  | $T_{stg}$  | -55 to +150    | $^{\circ}\text{C}$ |
| Ambient temperature range  |  | $T_{amb}$  | -55 to +100    | $^{\circ}\text{C}$ |
| Junction temperature   |  | $T_J$      | 100            | $^{\circ}\text{C}$ |
| Soldering temperature <sup>(1)</sup>   | max. 10 s, dip soldering distance                              | $T_{sld}$  | 260            | $^{\circ}\text{C}$ |

**Notes**

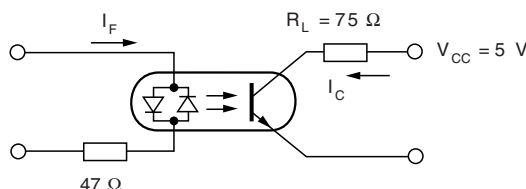
- Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of this document. Exposure to absolute maximum ratings for extended periods of the time can adversely affect reliability.
- <sup>(1)</sup> Refer to reflow profile for soldering conditions for surface mounted devices (SMD). Refer to wave profile for soldering conditions for through hole devices (DIP).

| <b>ELECTRICAL CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |   |           |             |      |      |      |                      |
|--|---|-----------|-------------|------|------|------|----------------------|
| PARAMETER  | TEST CONDITION                                | PART      | SYMBOL      | MIN. | TYP. | MAX. | UNIT                 |
| <b>INPUT</b>   |   |           |             |      |      |      |                      |
| Forward voltage  | $I_F = \pm 60\text{ mA}$                      |           | $V_F$       |      | 1.25 | 1.65 | V                    |
| Capacitance  | $V_R = 0\text{ V}, f = 1\text{ MHz}$          |           | $C_O$       |      | 50   |      | pF                   |
| Thermal resistance   |   |           | $R_{thja}$  |      | 750  |      | K/W                  |
| <b>OUTPUT</b>  |   |           |             |      |      |      |                      |
| Collector emitter capacitance  | $V_{CE} = 5\text{ V}, f = 1\text{ MHz}$       |           | $C_{CE}$    |      | 6.8  |      | pF                   |
| Thermal resistance   |   |           | $R_{thja}$  |      | 500  |      | $^{\circ}\text{C/W}$ |
| <b>COUPLER</b>   |   |           |             |      |      |      |                      |
| Collector emitter saturation voltage   | $I_F = \pm 10\text{ mA}, I_C = 2.5\text{ mA}$ |           | $V_{CEsat}$ |      | 0.25 | 0.4  | V                    |
| Coupling capacitance   |   |           | $C_C$       |      | 0.2  |      | pF                   |
| Collector emitter leakage current  | $V_{CE} = 10\text{ V}$                        | SFH620A-1 | $I_{CEO}$   |      | 2    | 50   | nA                   |
|  |   | SFH6206-1 | $I_{CEO}$   |      | 2    | 50   | nA                   |
|  |   | SFH620A-2 | $I_{CEO}$   |      | 2    | 50   | nA                   |
|  |   | SFH6206-2 | $I_{CEO}$   |      | 2    | 50   | nA                   |
|  |   | SFH620A-3 | $I_{CEO}$   |      | 5    | 100  | nA                   |
|  |   | SFH6206-3 | $I_{CEO}$   |      | 5    | 100  | nA                   |

**Note**

- Minimum and maximum values are testing requirements. Typical values are characteristics of the device and are the result of engineering evaluation. Typical values are for information only and are not part of the testing requirements.  
Still air, coupler soldered to PCB or base.

| <b>CURRENT TRANSFER RATIO</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |  |           |        |      |      |      |      |
|--|--|-----------|--------|------|------|------|------|
| PARAMETER  | TEST CONDITION                                   | PART      | SYMBOL | MIN. | TYP. | MAX. | UNIT |
| $I_C/I_F$  | $V_{CE} = 5\text{ V}$ , $I_F = \pm 10\text{ mA}$ | SFH620A-1 | CTR    | 40   |      | 125  | %    |
|  |  | SFH6206-1 | CTR    | 40   |      | 125  | %    |
|  |  | SFH620A-2 | CTR    | 63   |      | 200  | %    |
|  |  | SFH6206-2 | CTR    | 63   |      | 200  | %    |
|  |  | SFH620A-3 | CTR    | 100  |      | 320  | %    |
|  |  | SFH6206-3 | CTR    | 100  |      | 320  | %    |
|  | $V_{CE} = 5\text{ V}$ , $I_F = \pm 1\text{ mA}$  | SFH620A-1 | CTR    | 13   | 30   |      | %    |
|  |  | SFH6206-1 | CTR    | 13   | 30   |      | %    |
|  |  | SFH620A-2 | CTR    | 22   | 45   |      | %    |
|  |  | SFH6206-2 | CTR    | 22   | 45   |      | %    |
|  |  | SFH620A-3 | CTR    | 34   | 70   |      | %    |
|  |  | SFH6206-3 | CTR    | 34   | 70   |      | %    |



isfh620a\_08

Fig. 1 - Switching Times Linear Operation (without Saturation)

| <b>SWITCHING CHARACTERISTICS</b> ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified) |   |           |      |      |      |               |
|---|---|-----------|------|------|------|---------------|
| PARAMETER   | TEST CONDITION  | SYMBOL    | MIN. | TYP. | MAX. | UNIT          |
| Turn-on time  | $R_L = 75\text{ }\Omega$ , $I_F = \pm 10\text{ mA}$ , $V_{CC} = 5\text{ V}$ | $t_{on}$  |      | 3    |      | $\mu\text{s}$ |
| Rise time   | $R_L = 75\text{ }\Omega$ , $I_F = \pm 10\text{ mA}$ , $V_{CC} = 5\text{ V}$ | $t_r$     |      | 2    |      | $\mu\text{s}$ |
| Turn-off time   | $R_L = 75\text{ }\Omega$ , $I_F = \pm 10\text{ mA}$ , $V_{CC} = 5\text{ V}$ | $t_{off}$ |      | 2.3  |      | $\mu\text{s}$ |
| Fall time   | $R_L = 75\text{ }\Omega$ , $I_F = \pm 10\text{ mA}$ , $V_{CC} = 5\text{ V}$ | $t_f$     |      | 2    |      | $\mu\text{s}$ |
| Cut-off frequency   | $R_L = 75\text{ }\Omega$ , $I_F = \pm 10\text{ mA}$ , $V_{CC} = 5\text{ V}$ | $t_{ctr}$ |      | 250  |      | kHz           |

| <b>SAFETY AND INSULATION RATINGS</b>   |                            |        |        |           |      |                    |
|--|----------------------------|--------|--------|-----------|------|--------------------|
| PARAMETER                              | TEST CONDITION             | SYMBOL | MIN.   | TYP.      | MAX. | UNIT               |
| Climatic classification                | according to IEC 68 part 1 |        |        | 55/100/21 |      |                    |
| Comparative tracking index             |                            | CTI    | 175    |           | 399  |                    |
| $V_{IOTM}$                             |                            |        | 10 000 |           |      | V                  |
| $V_{IORM}$                             |                            |        | 890    |           |      | V                  |
| $P_{SO}$                               |                            |        |        |           | 400  | mW                 |
| $I_{SI}$                               |                            |        |        |           | 275  | mA                 |
| $T_{SI}$                               |                            |        |        |           | 175  | $^{\circ}\text{C}$ |
| Creepage distance                      | Standard DIP-4             |        | 7      |           |      | mm                 |
| Clearance distance                     | Standard DIP-4             |        | 7      |           |      | mm                 |
| Creepage distance                      | 400 mil DIP-4              |        | 8      |           |      | mm                 |
| Clearance distance                     | 400 mil DIP-4              |        | 8      |           |      | mm                 |
| Insulation thickness, reinforced rated | per IEC 60950 2.10.5.1     |        | 0.4    |           |      | mm                 |

**Note**

- As per IEC 60747-5-5, § 7.4.3.8.2, this optocoupler is suitable for "safe electrical insulation" only within the safety ratings. Compliance with the safety ratings shall be ensured by means of protective circuits.

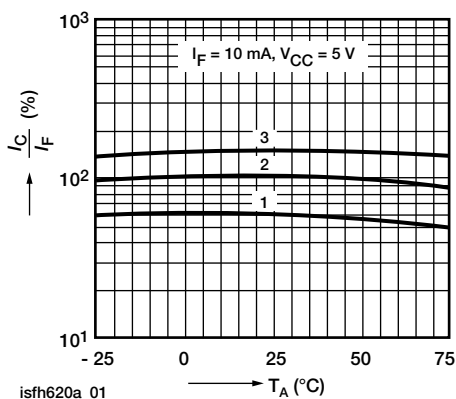
**TYPICAL CHARACTERISTICS** ( $T_{amb} = 25\text{ }^{\circ}\text{C}$ , unless otherwise specified)


Fig. 2 - Current Transfer Ratio (CTR) vs. Temperature

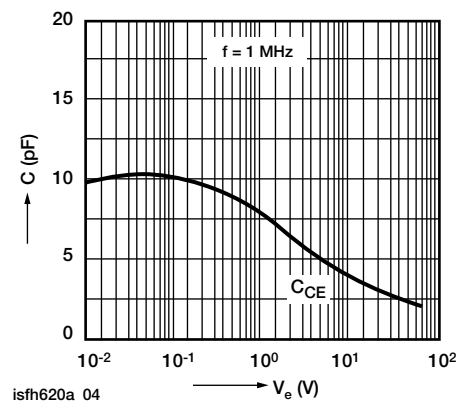


Fig. 5 - Transistor Capacitance (Typ.) vs. Collector Emitter Voltage

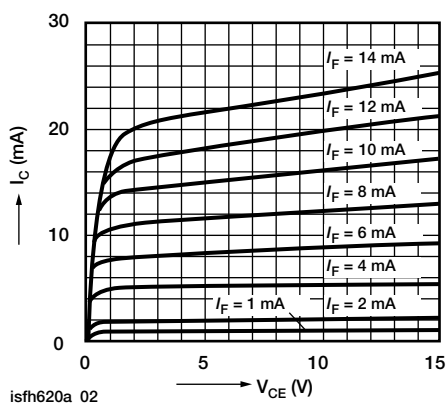


Fig. 3 - Output Characteristics (Typ.) Collector Current vs. Collector Emitter Voltage

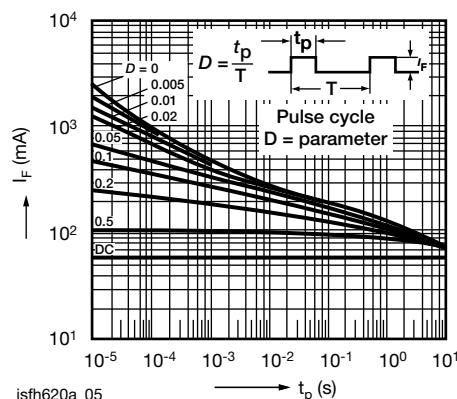


Fig. 6 - Permissible Pulse Handling Capability Forward Current vs. Pulse Width

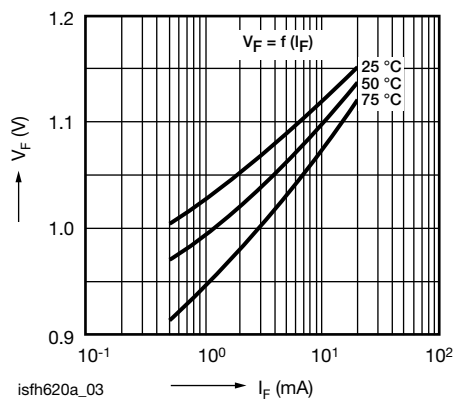


Fig. 4 - Diode Forward Voltage (Typ.) vs. Forward Current

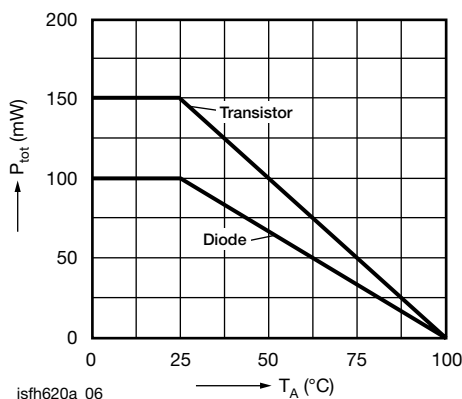


Fig. 7 - Permissible Power Dissipation vs. Ambient Temperature

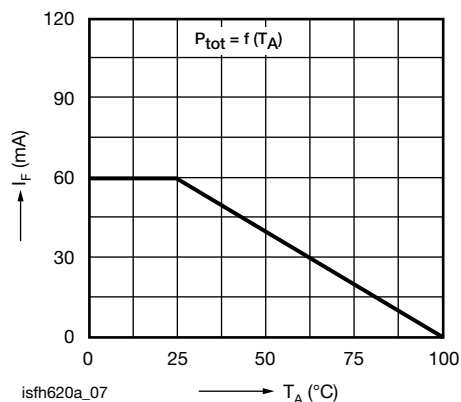
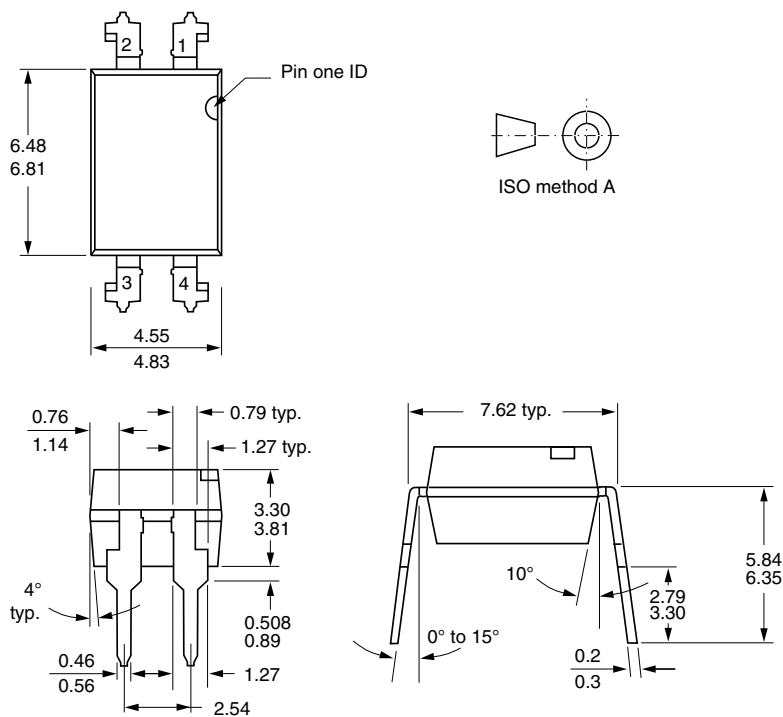


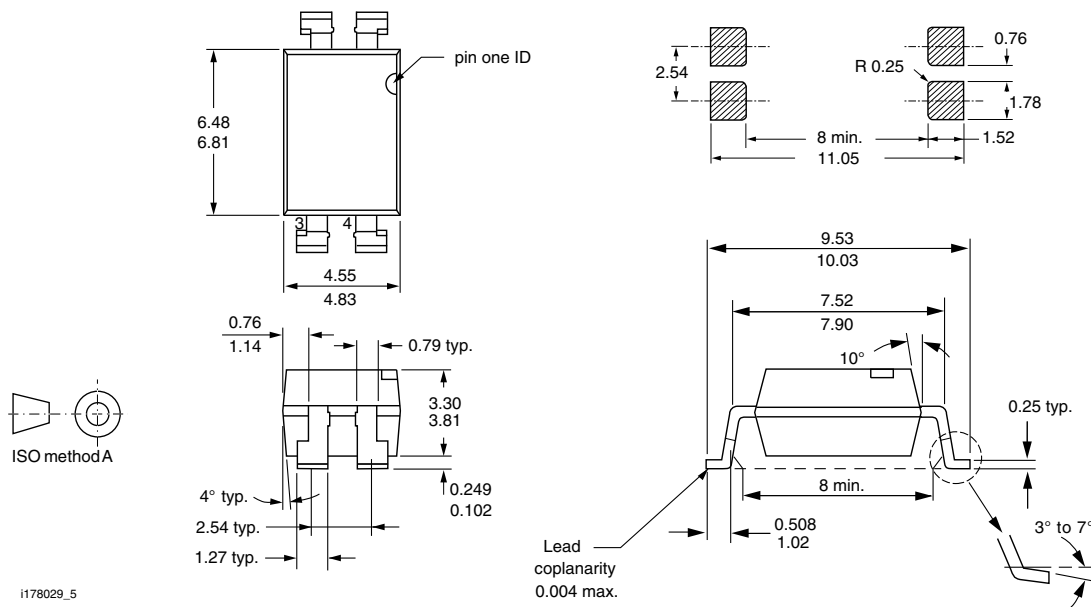
Fig. 8 - Permissible Diode Forward Current vs. Ambient Temperature

### PACKAGE DIMENSIONS in millimeters

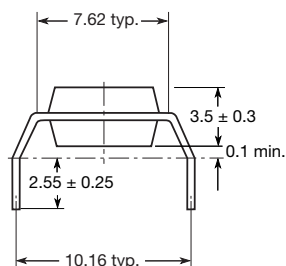




**PACKAGE DIMENSIONS** in millimeters

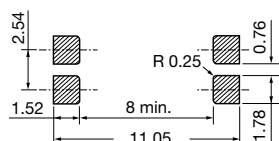
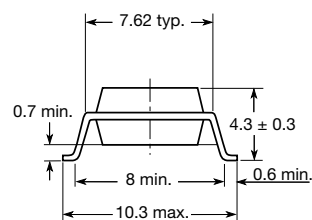


**Option 6**

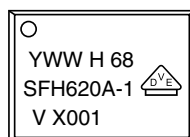


20802-18

**Option 7**



**PACKAGE MARKING** (Example)



**Notes**

- Only options 1 and 7 are reflected in the package marking.
- The VDE Logo is only marked on option1 parts.
- Tape and reel suffix (T) is not part of the package marking.



## Disclaimer

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